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ARS 836 (2012) (English): Fresh bitter
cassava -- Specification



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Fresh bitter cassava — Specification



Table of contents

1	Scope.....	1
2	Normative references.....	1
3	Definitions	1
4	Provisions concerning quality	2
4.1	General requirements	2
4.2	Minimum requirements	3
4.3	Total cyanogen content	3
4.4	Classification.....	4
5	Provisions concerning sizing	5
6	Provisions concerning tolerances.....	5
6.1	Quality tolerances	5
6.2	Size tolerances	5
7	Provisions concerning presentation.....	5
7.1	Uniformity.....	5
7.2	Packaging	6
7.3	Presentation.....	6
8	Marking or labelling.....	6
8.1	Consumer packages.....	6
8.2	Non-retain containers.....	7
8.3	Preparation of bitter cassava before consumption	7
9	Contaminants.....	7
9.1	Pesticide residues.....	7
9.2	Heavy metals	8
9.3	Other contaminants.....	8
10	Hygiene.....	8
11	Sampling and test	8
12	Criteria for conformity.....	8
	Annex A (informative) Bitter cassava roots illustrations.....	9
	Bibliography	10

Foreword

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Introduction

Cassava, (*Manihot esculenta* Crantz) is the third most important food crop in the tropics after rice and maize, and is consumed daily by up to one billion people, mostly in sub-Saharan Africa. Global cassava output in 2011 was expected to rise by over 6% from the previous year (2010), and to surpass 250 million metric tons for the first time (FAO, 2011).

Cassava is also replacing major traditional staples such as maize, finger millet, bananas, and plantains, because the productivity of these traditional staples have been declining as a result of deteriorating soil fertility and the adverse effects of climate change. Cassava on the other hand thrives in harsh conditions, and produces its carbohydrate-rich roots in poor soils, even in times of drought.

The rapid increases in cassava production has significant implications for the food, nutrition and energy security of Africa's rapidly rising urban population, which will increase from 414 million to over 1.2 billion by 2050 (UN, 2012). Despite enormous production challenges, at least 60% of global cassava production is projected to come from Africa, with significant potential to reduce the food gap, increase farm incomes in the rural areas, and reduce rural and urban food, nutrition and energy insecurity and poverty (Otim-Nape et al., 2008)

Given these significant attributes, the emerging vision for the crop (CGIAR 2000, Otim-Nape et al., 2008) in Africa, is that cassava will increasingly be a major contributor to improved food, nutrition, and health security, with smallholders producing surplus cassava harvests. Marketing increased quantities of high quality fresh cassava roots and leaves, and traditional and processed cassava products will improve their income generation potential. It is envisaged that producers will increase their competitiveness in the cassava value chain through better market response and efficient processing. Ultimately, cassava will become a major driving force in rural development and poverty reduction through industrial production and marketing. In spite of the evidence of brisk production growth and enormous scope for the crop, there is evidence of current overall contraction in production (FAO 2011), and declining productivity of the crop, due to major biotic and abiotic stresses. There are also other major production and marketing challenges which continue to impede progress (Nweke et al., 2001).

Cassava's market challenges result from poorly organized value-added chains, limited infrastructure, high transaction costs, competition from cheap imports, and limited investments in research, mechanization, production, harvesting and processing (Nweke et al 2001) .

Significant opportunities now exist for marketing of fresh and processed cassava for urban and rural consumption, high quality cassava flour for bread and other products, and cassava for fuel ethanol, and animal feed. These opportunities will be closely tied to changes in overall staple food markets, market diversification and competition within cassava food markets.

This African Standard was prepared to establish uniform quality and safety requirements for fresh bitter cassava in order to facilitate trade in fresh cassava in the domestic, regional and international markets.

Fresh bitter cassava¹ — Specification

1 Scope

This East African Standard specifies requirements and methods of sampling and test for varieties of fresh bitter² cassava roots of *Manihot esculenta* Crantz, of the *Euphorbiaceae* family, to be supplied to the consumer. Cassava roots intended for industrial processing is excluded.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ARS 53, *General principles of food hygiene — Code of practice*

ARS 56, *Prepackaged foods — Labelling*

WD-ARS 844:2012, *Cassava and cassava products — Determination of total cyanogens — Enzymatic assay method*

CAC/GL 21, *Principles for the establishment and application of microbiological criteria for foods*

CAC/RCP 44, *Recommended international code of practice for the packaging and transport of tropical fresh fruits and vegetables*

CAC/RCP 53, *Code of hygienic practice for fresh fruits and vegetables*

CODEX STAN 193, *Codex general standard for contaminants and toxins in food and feed*

ISO 874, *Fresh fruits and vegetables — Sampling*

ISO 7563, *Fresh fruits and vegetable — Vocabulary*

3 Definitions

For the purposes of this standard, the terms and definitions in ISO 7563, and the following terms and definitions shall apply.

3.1

fresh cassava roots

roots grown from a plant of the species *Manihot esculenta* Crantz having desirable characteristics of colour, texture and firmness typical of just harvested cassava at the time of sale

3.2

clean

practically free of visible soil, dust, or other visible foreign matter, except substances used to prolong its shelf life;

3.3

firm

resistant to externally applied pressure under ordinary circumstances

¹ Commonly known in certain regions by: manioc, mandioca, tapioca, aipim, yucca, etc.

² Sweet varieties of cassava are those that contain more than 50 mg/kg hydrogen cyanide (fresh weight basis).

3.4

practically free

product without defects in excess of those that can be expected to result from, and be consistent with good cultural and handling practices employed in the production and marketing of the fresh bitter cassava

3.5

sound

wholesome

free from disease, serious deterioration (such as but not limited to decay, breakdown, freezing damage, or soft or shrivelled specimens) or adulteration/contamination, that appreciably affects their appearance, edibility, the keeping quality of the produce or market value.

3.6

bitter cassava

cassava having high levels of hydrogen cyanide (fresh weight basis) and not suitable for direct human consumption

3.7

whole

fresh bitter cassava which has not been subjected to any cutting or peeling of its initial harvested mass with the exemption of trimming

3.8

fresh

appearance at the time of sale, similar visual characteristics to the fresh bitter cassava recently harvested (i.e., colour, texture, firmness or shrivelled)

3.9

industrial processing

production of potato products such as starch, flour, livestock feeds, paste, granules and syrups

3.10

food grade material

one that will not transfer non-food chemicals into the food and contains no chemicals which would be hazardous to human health

3.11

extraneous matter

organic matter of plant origin other than fresh bitter cassava

3.12

foreign matter

organic and inorganic materials (such as sand, soil, glass) other than extraneous matter in the bitter cassava

4 Provisions concerning quality

4.1 General requirements

Fresh bitter cassava roots shall have reached an appropriate degree of physiological development taking into account the characteristics of the variety and the area in which they are grown. The bitter cassava roots shall have been carefully harvested.

The development and condition of the fresh bitter cassava shall be such as to enable it to;

- a) withstand normal transport and handling conditions, and
- b) arrive in a satisfactory condition at the place of destination.

4.2 Minimum requirements

4.2.1 In all classes, subject to the special provisions for each class and the tolerances allowed, the bitter cassava roots shall be:

- a) firm;
- b) wholesome/sound, sound, produce affected by rotting, mould or deterioration such as to make it unfit for consumption is excluded;
- c) whole;
- d) fresh;
- e) of colour, taste and texture characteristic of the variety;
- f) clean, practically free of any visible foreign matter, except permitted substances used to prolong its shelf life;
- g) of a characteristic skin colour and free from flesh discolouration (vascular streaking);
- h) practically free of pests affecting the general appearance of the produce;
- i) practically free of damage caused by pests and diseases;
- j) free of abnormal external moisture, excluding condensation following removal from cold storage;
- k) free of loss of colour in the flesh;
- l) free of any foreign smell and/or taste with exception of preservation agents allowed; and
- m) practically free of mechanical damage and bruising.

4.2.2 The cut at the distal (narrow) end of the cassava shall not exceed 2 cm in diameter.

4.2.3 The stalk end of the root should have a clean cut between 1 cm and 2.5 cm in length in case of varieties that have distinct stalk.

4.2.4 Tolerances for the quality requirements shall be such that:

- a) a total of not more than 10 % by weight or number of the bitter cassava in the lot may fail the requirements;
- b) not more than 3 % by weight or number of the bitter cassava may be affected by rot, mould or deterioration as to make it unfit for consumption;
- c) not more than 3 % by weight or number of the bitter cassava may be affected by damage caused by pests; and
- d) not more than 3 % by weight or number of the bitter cassava may be affected by rot, mould or deterioration; and damage caused by pests in combination.

4.3 Total cyanogen content

When tested in accordance to WD-ARS 844:2012, bitter cassava roots shall have be shown to have more than 50 mg/kg of hydrogen cyanide (fresh weight basis)

CD-ARS 836:2012

4.4 Classification

4.4.1 Fresh bitter cassava may be classified before marketing. Where classification is done the following grades shall be used in accordance with the requirements of each class and the quality tolerances in Clause 6.

- a) Extra Class;
- b) Class I; and
- c) Class II.

4.3.2 Extra Class

Extra class bitter cassava shall be cassava roots that meet the minimum requirement in Clause 4.2 and are:

- a) of superior quality in terms of taste, texture, skin and flesh colour.
- b) characteristic of the variety and/or commercial type, uniform in shape, quality and size.

Extra class bitter cassava roots shall be free from defects, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package and not in any case affecting not more than 2 % of the cassava roots.

4.3.3 Class I

Class I bitter cassava storage roots shall be cassava roots that meet the minimum requirement in Clause 4.2 and are:

- a) of good quality; and
- b) characteristic of the variety and/or commercial type.

The following slight defects, however, may be allowed, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:

- a) sight defects in shape not exceeding 5% of the roots;
- b) bruising, not exceeding 10 % of the surface area of the roots and
- c) scraped areas, not exceeding 20 % of the surface area of the roots
- d) scarred and healed damage, not exceeding 5% of the surface area of the roots.

The defects shall not, in any case, affect the pulp of the produce.

4.3.4 Class II

Class II bitter cassava storage roots shall be cassava, which does not qualify for inclusion in the higher classes, but satisfies the minimum requirements specified in Clause 4.2.

The following defects, however, may be allowed, provided the cassava retains its essential characteristics as regards the quality, the keeping quality and presentation:

- a) defects in shape not exceeding 10 % of the roots;
- b) bruising, not exceeding 20 % of the surface area of roots and

- c) scraped areas, not exceeding 30 % of the surface area of roots.
- d) scarred and healed damage, not exceeding 10% of the surface area of the roots.

The defects must not, in any case, affect the pulp of the produce.

5 Provisions concerning sizing

In all cases, cassava must not be less than 300 g in weight nor less than 20 cm in length.

Bitter cassava shall be coded in sizes in accordance with Table 1. Size shall be determined by measuring the diameter at the thickest cross-section of the root.

Size tolerances for all classes shall be a maximum of 10 % by number of the weight of cassava corresponding to the size immediately above or below the size declared or indicated on the package.

Table 1 — Size code requirements of the sweet cassava roots

Size code	Size	Diameter cm
A	Large	>10
B	Medium	7.6 - 10.0
C	Small	<7.6

6 Provisions concerning tolerances

Tolerances in respect of quality and size shall be allowed in each package for produce not satisfying the requirements of the class indicated.

6.1 Quality tolerances

6.1.1 “Extra” Class

Five percent by number or weight of bitter cassava roots not satisfying the requirements of the class, but meeting those of Class I or, exceptionally, coming within the tolerances of that class.

6.1.2 Class I

Ten percent by number or weight of bitter cassava roots not satisfying the requirements of the class, but meeting those of Class II or, exceptionally, coming within the tolerances of that class.

6.1.3 Class II

20 % by number or weight of bitter cassava roots satisfying neither the requirements of the class nor the minimum requirements, with the exception of produce affected by rotting or any other deterioration rendering it unfit for consumption.

6.2 Size tolerances

For all classes, 10% by number or weight of bitter cassava corresponding to the size immediately above and/or below that indicated on the package.

7 Provisions concerning presentation

7.1 Uniformity

The contents of each package must be uniform and contain only bitter cassava roots of the same origin, variety and/or commercial type, quality and size. The visible part of the contents of the package must be representative of the entire contents.

7.2 Packaging

7.2.1 Fresh bitter cassava may be sold packaged or loose. Packaged bitter cassava must be packed in such a way as to protect the produce properly. The materials used inside the package must be new³, clean, and of a quality such as to avoid causing any external or internal damage to the produce and safeguard the hygienic, nutritional, and organoleptic qualities of the produce. The use of materials, particularly of paper or stamps bearing trade specifications is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

7.2.2 In order to maintain produce quality during transportation and marketing, fresh bitter cassava shall be packaged and transported in accordance with the appropriate sections CAC/RCP 44.

7.2.3 The net weight of each package of fresh bitter cassava may be required to meet the regulations of the destination country.

7.2.1 Description of containers

The containers shall meet the quality, hygiene, ventilation and resistance characteristics to ensure suitable handling, shipping and preserving of the fresh bitter cassava. Packages must be free of all foreign matter and smell.

7.3 Presentation

The visible part of the contents of the package must be representative of the entire contents. A special effort should be made to suppress camouflage, i.e. concealing in the lower layers of the package produce inferior in quality and size to that displayed and marked.

Similarly prohibited is any packaging method or practice intended to give a deceptively superior appearance to the top layer of the consignment.

8 Marking or labelling

8.1 Consumer packages

8.1.1 In addition to the requirements of ARS 56, the following specific requirements shall apply and shall be **legibly** and **indelibly** marked:

- a) name of the produce to be shown on the label shall be "Fresh bitter cassava";
- b) name and location address of the vendor and/or packer shall be declared;
- c) country of origin of the produce, and optionally, place of origin such as district, or region;
- d) commercial identification shall be declared by:
 - i) grade (only when classified);
 - ii) variety;
 - iii) size (size code); and
 - iv) net weight (in metric system).
- e) lot identification (batch number);
- f) declaration of preservatives, if used;
- g) date of harvest;

³ For the purposes of this Standard, this includes recycled material of food-grade quality.

- h) packing date;
- i) storage conditions; and
- j) Caution "Not to be eaten raw".

8.2 Non-retain containers

Each package must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside, or in the documents accompanying the shipment.

8.2.1 Identification

Name and address of exporter, packer and/or dispatcher. Identification code (optional).⁴

8.2.2 Nature of Produce

Name of the produce if the contents are not visible from the outside. Name of the variety and/or commercial type (optional).

8.2.3 Origin of produce

Country of origin and, optionally, district where grown or national, regional or local place name.

8.2.4 Commercial Identification

- Class;
- Size (size code or minimum and maximum diameter in centimetre);
- Net weight
- Preparation instructions in accordance with 8.3.

8.2.5 Official Inspection Mark (optional)

8.3 Preparation of bitter cassava before consumption

A statement on preparation instructions indicating the following is required:

- a) Bitter cassava shall not be eaten raw;
- b) Bitter cassava shall be peeled, de-pithed, scraped, sliced into pieces, rinsed and fully cooked before consumption; and
- c) Cooking or rinsing water shall not be consumed or used for other food preparation purposes.

9 Contaminants

9.1 Pesticide residues

Fresh bitter cassava shall conform to those maximum residue limits for pesticide residues established by Codex Alimentarius Commission for this commodity.

⁴ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in the case where a code mark is used, the reference "packer and/or dispatcher (or equivalent abbreviations)" has to be indicated in close connection with the code mark.

CD-ARS 836:2012

9.2 Heavy metals

Fresh bitter cassava shall comply with those maximum levels for heavy metal contaminants established by the Codex Alimentarius Commission for this commodity.

9.3 Other contaminants

9.3.1 Fresh bitter cassava shall conform to those maximum levels of the Codex General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193).

9.3.2 In the absence of a Codex maximum level for hydrogen cyanide, an acceptable maximum level shall be set on a safety basis by the national legislation of the importing country pending the outcome of the work of the Codex Committee on Contaminants in Foods on cyanogenic glycosides.

10 Hygiene

10.1 The produce covered by the provisions of this standard shall be prepared and handled in accordance with the appropriate sections of ARS 53 and CAC/RCP 53.

10.2 The produce shall comply with any microbiological criteria established in accordance with the CAC/GL 21.

11 Sampling and test

Sampling shall be done in accordance with ISO 874. Tests for pesticide residues, contaminants and toxins shall be conducted in accordance with the recommended methods of the Codex Alimentarius Commission.

12 Criteria for conformity

A lot shall be declared as conforming to this standard if samples inspected or analysed for quality requirements conform to the provisions of this standard.

Annex A
(informative)

Bitter cassava roots illustrations



Unprocessed cassava roots

Bibliography

EAS 778:2012, *Fresh bitter cassava — Specification*

CXS 300e-2010(A2011), *Standard for Bitter Cassava*

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